

AD-A106 342

BAKER (MICHAEL) JR INC BEAVER PA

F/G 13/13

NATIONAL DAM SAFETY PROGRAM. DIGIULIAN DAM (INVENTORY NUMMER VA--ETC(U)

MAY 81 C S ANDERSON

DACW65-80-D-0032

NL

UNCLASSIFIED



END  
DATE  
FILMED  
11-8  
DTIC

AD A106342

# SHENANDOAH RIVER BASIN

Name of Dam: Dittman Dam

**LEVEL**

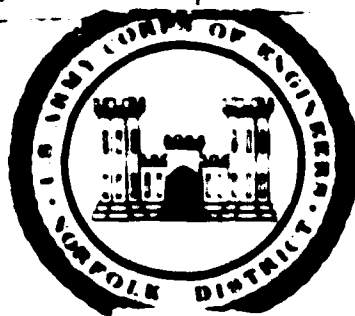
①

Location: Fauquier County, Commonwealth of Virginia

Inventory Number: VA 08102

## PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM.

U.S. Army Corps of Engineers, Norfolk District  
Norfolk, Virginia 23510  
Phase I Inspection Report



DTIC

OCT 30 1981

H

Final Report

DAW 280-12000

W. S. Anderson, Jr.

PREPARED FOR

NORFOLK DISTRICT CORPS OF ENGINEERS  
803 FRONT STREET  
NORFOLK, VIRGINIA 23510

PREPARED BY

MICHAEL BAKER, JR., INC.  
DEAVER, PENNSYLVANIA 15009

12

May 1981

81 10 27 304

DTIC FILE COPY

Public Release  
Distribution Unlimited

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER VA 06102	2. GOVT ACCESSION NO. <b>AD-H106342</b>	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report National Dam Safety Program Mitollian Dam Fauquier County, VA		5. TYPE OF REPORT & PERIOD COVERED Final
7. AUTHOR(s) Michael Baker, Inc., Inc. Beaver, Pennsylvania 15009		6. PERFORMING ORG. REPORT NUMBER
8. PERFORMING ORGANIZATION NAME AND ADDRESS Michael Baker, Inc., Inc. Beaver, Pennsylvania 15009		9. CONTRACT OR GRANT NUMBER DAW-65-80 (D-001)
10. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer District, Norfolk 400 Front St., Norfolk, VA 23510		11. PROGRAM ELEMENT PROJECT YEAR AREA & WORK UNIT NUMBER
12. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. REPORT DATE May 1981
		14. NUMBER OF PAGES
		15. SECURITY CLASS. of this report DECLASSIFIED
		16. DECLASSIFICATION DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT of this Report  Approved for public release; distribution unlimited		
18. DISTRIBUTION STATEMENT of the abstract entered in Block 20 if different from Report		
19. SUPPLEMENTARY NOTES  Copies are obtainable from National Technical Information Service, Springfield, Virginia 22161		
20. KEY WORDS (Continue on reverse side if necessary and identify by Block number)  Dams VA National Dam Safety Program Phase I Dam Safety Dam Inspection		
21. ABSTRACT (Continue on reverse side if necessary and identify by Block number)  See Reverse Side		

### III. Abstract

Pursuant to Public Law 92-663, Phase I Inspection Reports are prepared under guidelines contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D.C., 1974. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation, however, the investigation is intended to identify areas for such studies.

Based upon the field conditions at the time of the field inspection and the available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional (in-depth) study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

# PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

## CONTENTS

	<u>Page</u>
Preface . . . . .	i
Brief Assessment of Dam . . . . .	1
Overall View of Dam . . . . .	5
Section 1: Project Information . . . . .	7
Section 2: Engineering Data . . . . .	11
Section 3: Visual Inspection . . . . .	13
Section 4: Operational Procedures . . . . .	15
Section 5: Hydraulic Hydrologic Data . . . . .	17
Section 6: Dam Stability . . . . .	19
Section 7: Assessment Remedial Measures . . . . .	21

## Appendices

- I. Plates
- II. Photographs
- III. Visual Inspection Check List
- IV. General References

Accession For	
1975-2001	<input checked="" type="checkbox"/>
1975-2001	<input type="checkbox"/>
1975-2001	<input type="checkbox"/>
1975-2001	<input type="checkbox"/>
By	
Distribution/	
Availability Codes	
1975-2001	
1975-2001	

NAME OF DAM: DIGIULIAN DAM

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

Name of Dam: DiGiulian Dam  
State: Commonwealth of Virginia  
County: Fauquier  
USGS 7.5 Minute Quadrangle: Flint Hill, Virginia  
Stream: Buck Run  
Date of Inspection: 18 May 1981

↓  
BRIEF ASSESSMENT OF DAM

DiGiulian Dam is an earthfill embankment 29.9 feet high<sup>1</sup> and 281 feet long. The principal spillway is a corrugated metal pipe riser located near the center of the dam. An emergency spillway is located on the right abutment.<sup>2</sup> The dam, 7.73 miles northeast of Flint Hill, Virginia, is used as a farm pond and for recreation. The dam is owned by John P. DiGiulian and William C. Bauknight, co-trustees of the residuary trust U/W of A.P. DiGiulian. DiGiulian Dam is a "small" size - "significant" hazard structure as defined by the Recommended Guidelines for Safety Inspections of Dams. The dam and appurtenant structures were in good overall condition at the time of the inspection. Maintenance of the dam is considered to be inadequate. A stability check of the dam is not required.

✓ Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 100-year flood was selected as the spillway design flood (SDF). The SDF was routed through the reservoir and found to overtop the dam by a maximum depth of 0.7 foot with an average critical velocity of 2.9 f.p.s. Total duration of dam overtopping would be approximately 0.8 hours. Overtopping flows are not considered to be seriously detrimental to the embankment. The spillway is capable of passing up to 84 percent of the SDF or 12 percent of the Probable Maximum Flood (PMF) without overtopping the dam. The spillway is adjudged as inadequate, but not seriously inadequate.

↗ The saturated area 50 feet from the principal spillway outlet should be regraded to provide better surface drainage.

<sup>1</sup>Measured from the streambed at the downstream toe to the lowest point on the embankment crest.

<sup>2</sup>Facing downstream.

NAME OF DAM: DIGIULIAN DAM

It should then be examined on a regular basis and after periods of heavy rainfall for flows or turbidity. If turbidity and or flows are noted, a qualified geotechnical firm should be retained to further evaluate the condition.

Regular inspections should be made of the dam and appurtenant structures. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be completed annually.

A formal warning system and emergency action plan should be developed and implemented as soon as possible.

The following repair items should be accomplished as part of the general maintenance of the dam:

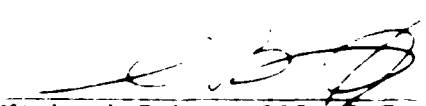
- 1) Remove all trees and brush growing on the embankment by cutting at ground level. Trees with a trunk diameter greater than 3 inches should also have their root systems removed and the resultant holes backfilled, compacted and seeded.
- 2) Regrade and compact the eroded areas on the upstream face of the embankment, and provide erosion protection above normal pool level.
- 3) Backfill, compact, and seed animal burrows.
- 4) Remove debris, trees, and brush blocking the downstream channel.
- 5) Install a staff gage to monitor reservoir levels above normal pool.

MICHAEL BAKER, JR., INC.

SUBMITTED:

Original Signed by:  
Carl S. Anderson, Jr.

Carl S. Anderson, Jr., P.E.  
Acting Chief, Design Branch

  
Michael Baker, III, P.E.  
Chairman of the Board and  
Chief Executive Officer

RECOMMENDED:

Original Signed by:  
JAMES A. WALSH

Jack G. Starr, P.E.  
Chief, Engineering

APPROVED:

Original Signed by:  
RONALD E. HUDSON

Ronald E. Hudson  
Colonel, Corps of Engineers  
District Engineer

Date:

SEP 1, 1981



NAME OF DAM: DIGIULIAN DAM





OVERALL VIEW OF DAM

ENCLOSING PAGE BLANK-NOT FILMED

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
NAME OF DAM: DIGIULIAN DAM ID# VA 06102

SECTION 1 - PROJECT INFORMATION

1.1 General

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 12, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Description of Project

1.2.1 Description of Dam and Appurtenances: DiGiulian Dam is an earthfill embankment 29.9 feet high<sup>1</sup> and 281 feet long. The crest of the dam is about 10 feet wide, and the minimum elevation of the crest is 1003.5 feet Temporary Bench Mark (T.B.M.).<sup>2</sup> The slope of the upstream embankment is 2.4H:1V (Horizontal to Vertical), and the slope of the downstream embankment is 2.5H:1V. There is no information available on any possible zoning of the embankment. No evidence of any internal drainage system for the dam was found. Large stones have been used to riprap the upstream face of the embankment at and slightly above normal pool level.

<sup>1</sup>Measured from the streambed at the toe to the minimum crest elevation.

<sup>2</sup>All elevations are referenced to a Temporary Bench Mark located at the invert of the 6-inch diameter hole in the corrugated metal pipe riser. The assumed elevation is 1000.0 feet.

NAME OF DAM: DIGIULIAN DAM

The principal spillway is comprised of two sections of corrugated metal pipe (CMP). The first section is a 15-inch diameter CMP with a crest elevation of 1001.0 feet T.B.M. A 6-inch diameter hole has been put in the pipe and has a bottom elevation of 1000.0 feet T.B.M. The second section of pipe is a 1.5-foot long, 21-inch diameter CMP with a crest elevation of 1002.1 feet T.B.M. The second section has been loosely placed over the first section to form a type of trash rack. Water can enter the principal spillway by entering the 6-inch diameter hole, by passing between the 15-inch diameter and 21-inch diameter pipes and overtopping elevation 1001.0 feet T.B.M., or by passing over the crest of the 21-inch diameter pipe. Water is carried through the embankment in a 12-inch diameter CMP with an outlet invert elevation of 974.2 feet T.B.M. The pipe is estimated to be 104 feet long and discharges into the natural stream channel.

The emergency spillway is a trapezoidal channel located on the right abutment. It is on natural ground and has a base width of 68 feet. The crest of the emergency spillway is at elevation 1002.1 feet T.B.M. The emergency spillway channel is not well defined. It passes through a wooded area into the downstream channel.

DiGiulian Dam has a drainage area of 0.52 square miles. The area is primarily woods and pastureland with moderate to steep slopes.

1.2.2 Location: DiGiulian Dam is located in Fauquier County, Virginia on Buck Run, a tributary to the Rappahannock River. The dam is 7.73 miles northeast of Flint Hill, Virginia. A Location Plan is included with this report in Appendix I.

1.2.3 Size Classification: The height of the dam is 29.9 feet, and the reservoir storage capacity at the crest of the dam (elevation 1003.5 feet T.B.M.) is 275 acre-feet. The dam is in the "small" size category as defined by the Recommended Guidelines for Safety Inspections of Dams.

NAME OF DAM: DIGIULIAN DAM

- 1.2.4 Hazard Classification: A house is located 6200 feet downstream, and Virginia Route 635 is located 1.98 miles downstream. Loss of human life in the event of a dam failure is not considered highly probable; however, economic losses due to damage of the house and Virginia Route 635 are likely in the event of a dam failure. DiGiulian Dam is considered to be in the "significant" hazard category as defined by the Recommended Guidelines for Safety Inspections of Dams. The hazard classification used to categorize dams is a function of location only and is unrelated to stability or probability of failure.
- 1.2.5 Ownership: The dam and reservoir are owned by John P. DiGiulian and William C. Bauknight, co-trustees of the residuary trust U W of A.P. DiGiulian
- 1.2.6 Purpose of Dam: The reservoir is used as a farm pond and for recreation.
- 1.2.7 Design and Construction History: No information on the design or construction history of this dam was available for this report.
- 1.2.8 Normal Operating Procedures: The reservoir level is automatically maintained by the principal spillway (elevation 1000.0 T.B.M.). No formal operating procedures are followed for this structure.

### 1.3 Pertinent Data

- 1.3.1 Drainage Area: The total drainage area tributary to DiGiulian Dam is 0.52 square miles to the north and west of the dam.
- 1.3.2 Discharge at Dam Site: The maximum discharge from the reservoir is unknown.

Pool level at minimum top of dam.

Principal Spillway	93 ft. s
Emergency Spillway	454.0 ft. s

NAME OF DAM: DIGIULIAN DAM

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are provided in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation (feet T.B.M.)	Area (acres)	Reservoir Capacity		Length (feet)
			Acre- feet	Watershed (inches)	
Top of Dam	1003.5	16.3	275.0	9.9	1840.0
Emergency spillway	1002.1	14.9	253.0	9.1	1680.0
Principal spillway crest	1000.0	12.9	224.0	8.1	1520.0
Streambed at toe	973.6	-	-	-	-

NAME OF DAM: DIGIULIAN DAM

## SECTION 2 - ENGINEERING DATA

- 2.1 Design: Design plans, specifications, and boring logs were unavailable for use in preparing this report. No stability analyses or hydrologic and hydraulic data were available for review.
- 2.2 Construction: Construction records, as-built plans, and inspection logs were unavailable for review.
- 2.3 Evaluation: There is insufficient information to evaluate foundation conditions and embankment stability. No design or construction records were available for use in assessing the condition of the dam. All evaluations and assessments in this report were based upon field observations and office analyses.

NAME OF DAM: DIGIULIAN DAM

## SECTION 3 - VISUAL INSPECTION

### 3.1 Findings

3.1.1 General: The field inspection was conducted on 18 May 1981. At the time of the inspection, the pool elevation was 1000.4 feet T.B.M. and the tailwater elevation was 973.6 feet T.B.M. The weather was overcast with drizzle and a temperature of 65° Fahrenheit. The ground surface was wet. The dam and appurtenant structures were found to be in good condition. Deficiencies found during the inspection will require remedial treatment. The following are brief summaries of these deficiencies. A Field Sketch of conditions found during the inspection is presented in Appendix I. The complete visual inspection check list is provided in Appendix III. No record was found of any previous inspections.

3.1.2 Dam: The embankment was found to be in generally good condition with no surface cracks or slides observed. Riprap consisting of large rocks has been placed along the upstream face of the dam at normal pool level. This riprap extends to approximately 1 - 2 ft. above normal pool level. Erosion of the embankment face above the riprap is occurring along the entire length of the dam. This erosion has created vertical drops of 1 foot in some areas.

The entire embankment except the centerline of the crest is covered with trees and brush. Rodent holes were observed on the downstream face of the embankment at scattered locations.

No seepage was observed, but an area 50 feet to the right of the outlet pipe was wet and saturated.

3.1.3 Appurtenant Structures: The principal spillway as described in Section 1.2.1.1 was found to be in fair condition. A pool is forming at the downstream outlet due to blockage of the channel with debris.

NAME OF DAM: CINCINNATI DAM

RECORDING PAGE BLANK-NOT FILLED

The approach area to the emergency spillway is broad and unobstructed with a light grass cover. No signs of erosion or sloughing were observed.

3.1.4 Reservoir Area: The reservoir area consists of wooded areas and pastures with steep slopes. Minor erosion around the reservoir edges at normal pool level was observed. Soundings taken at the time of inspection revealed the impoundment to be 21 feet deep at a distance of 150 feet from shore near the center of the embankment. No significant accumulations of debris were observed in the reservoir area.

3.1.5 Downstream Channel: The downstream channel is overgrown with brush and trees. It flows past a house 6000 feet downstream and passes under Virginia Route 635, 2 miles downstream.

3.1.6 Instrumentation: There was no instrumentation present at the dam.

3.2 Evaluation: In general, the dam and appurtenant structures were in fair condition. The embankment should be cleared of all trees and brush by cutting them at ground level. Trees with a trunk diameter greater than 3 inches should have their root systems removed, and the resultant holes should be backfilled, compacted, and seeded. The animal burrows should be backfilled, compacted, and seeded. The trees and brush should be removed from the downstream channel.

The eroded areas on the upstream face of the embankment should be regraded and protected by some form of erosion protection. The saturated area 50 feet to the right of the outlet should be regraded to allow better drainage and monitored for seepage.

A staff gage should be installed to monitor reservoir levels above normal pool.

NAME F. DAM COLUMBIAN DAM



#### SECTION 4 - OPERATIONAL PROCEDURES

- + 1 Procedures. Operation of the dam is an automatic function controlled by the principal spillway and the emergency spillway. Water entering the reservoir flows into the principal spillway at elevation 1000.0 feet T.B.M. When inflow is sufficient to cause the reservoir level to rise above elevation 1002.1 feet T.B.M., discharge takes place through the emergency spillway on the right abutment.
- + 2 Maintenance of Dam. Maintenance of the dam is the responsibility of the owner. An inspection or maintenance schedule has not been instituted.
- + 3 Maintenance of Operating Facilities. No operating facilities were observed at the time of inspection.
- + 4 Warning System. At the time of inspection, there was no warning system or emergency action plan in operation.
- + 5 Evaluation. Maintenance of the dam in the past has been inadequate. Regular inspections of the dam and appurtenant structures should be made and documented. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be corrected annually. A warning system and emergency action plan should be developed and implemented as soon as possible. The plan should include:
  - a How to operate the dam during an emergency.
  - b Who to notify, including public officials, in case evacuation from the downstream area becomes necessary.

The local Emergency Services Coordinator of the State Office of Energy and Emergency Services can assist in the preparation of an emergency warning plan.

NAME F DAM CIGUILLIAN DAM

## SECTION 5 - HYDRAULIC HYDROLOGIC DATA

- 5.1 Design: No design data were available for use in preparing this report.
- 5.2 Hydrologic Information: No rainfall, stream gage or reservoir stage records are maintained for this dam.
- 5.3 Flood Experience: No records were available.
- 5.4 Flood Potential: The Probable Maximum Flood (PMF), 1.2 Probable Maximum Flood (1.2 PMF), and 100-year flood were developed and routed through the reservoir by use of the HEC-1 DB computer program (Reference 9, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's T and R coefficients for the local drainage area were estimated from basin characteristics. The rainfall applied to the unit hydrograph was taken from publications by the U.S. Weather Bureau and the National Oceanic and Atmospheric Administration (References 16 and 17, Appendix IV). Rainfall losses for the PMF were estimated at an initial loss of 1.0 inches and a constant loss rate of 0.05 inches per hour thereafter. Rainfall losses for the 100-year flood were estimated at an initial loss of 1.5 inches and a constant loss rate of 0.15 inches per hour thereafter.
- 5.5 Reservoir Regulation: Pertinent dam and reservoir data are provided in Table 1.1, Paragraph 1.3.3.

Regulation of flow from the reservoir is automatic. Normal flows are maintained by the crest of the principal spillway at elevation 1000.0 feet T.B.M. Water may also discharge through the emergency spillway on the right abutment when the reservoir rises above an elevation of 1002.1 feet T.B.M.

Outlet discharge capacity was computed by hand. Reservoir area was estimated from the Flint Hill, Virginia 7.5 minute USGS quadrangle, and storage capacity curves above normal pools were computed by the HEC-1 DB program. All flood routings began with the reservoir at normal pool. Flow through the principal spillway was included in the routings.

- 5.6 Overtopping Potential: The probable rise of the reservoir and other pertinent information on the reservoir performance are shown in the following table:

NAME OF DAM: DIGIULIAN DAM

TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal <sup>1</sup>	Hydrographs		
		100-year flood	1/2 PMF	PMF <sup>2</sup>
Peak flow, c.f.s.				
Inflow	0.3	1367.0	3448.0	6896.0
Outflow	0.3	941.0	2984.0	6564.0
Peak elev., ft. T.B.M.	1000.4	1004.2	1006.1	1007.6
Non-overflow section (elev. 1003.5 ft. T.B.M.)				
Depth of flow, ft.	-	0.7	2.6	4.1
Average velocity, f.p.s. <sup>3</sup>	-	2.9	7.9	9.4
Total duration of over topping, hrs.	-	0.8	2.9	5.2
Tailwater elev., ft. T.B.M.	973.2			

<sup>1</sup>Conditions at time of inspection.

<sup>2</sup>The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in a region.

<sup>3</sup>Velocity estimates were based on critical depth at control section.

5.7 Reservoir Emptying Potential: No operating facilities for emptying the reservoir were observed at the time of the inspection.

5.8 Evaluation: DiGiulian Dam is a "small" size - "significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range between the 100-year flood and the 1/2 PMF. Due to the risk involved, the 100-year flood was selected as the SDF. The 100-year flood was routed through the reservoir and found to overtop the dam by a maximum depth of 0.7 feet with an average critical velocity of 2.9 feet per second (f.p.s.). Total duration of dam overtopping would be 0.8 hours. The spillways are capable of passing up to 12 percent of the PMF or 84 percent of the SDF without overtopping the dam.

Conclusions pertain to present day conditions and the effect of future development on the hydrology has not been considered.

NAME OF DAM: DIGIULIAN DAM

## SECTION 6 - DAM STABILITY

- 6.1 Foundation and Abutments: Other than observations made at the time of the inspection, no information is available on foundation conditions. The dam is located within the Blue Ridge Province. This particular area is characterized by Virginia Blue Ridge Complex Granite dating from the Precambrian era. Soil samples taken from the area were brown silt having low plasticity with a trace of fine sand.

No evidence of substantial seepage was observed during the inspection nor any problems associated with piping of the foundation or abutment materials. Based on the visual inspection of the dam, it is believed no internal drainage system for the dam exists. Information on the keying of the dam into the foundation was not available.

### 6.2 Embankment

- 6.2.1 Materials: There was no information describing the nature of the materials or any zoning within the embankment. The outer embankment was found to be brown low plasticity silt, trace fine sand. No obvious sources of borrow were discovered in the immediate area of the dam.

- 6.2.2 Stability: Design plans and any previous stability analysis results were unavailable for this inspection. The dam is 29.9 feet high with a crest width of 10 feet. The upstream slope was measured at 2.4H:1V with an eroded slope above the water surface of 1.5H:1V extending to within 3 feet of the waters edge. The downstream side has a consistent slope of 2.5H:1V. The outlet facilities do not provide the capability to drain the reservoir in the event of an emergency; therefore, the embankment is not considered susceptible to rapid drawdown.

According to the guidelines presented in Design of Small Dams by the U.S. Department of the Interior, Bureau of Reclamation, for small homogeneous dams of the described material with stable foundation and not subject to rapid drawdown; the recommended slopes are 3H:1V for the upstream face and

NAME OF DAM: DIGIULIAN DAM

2.5H:1V for the downstream slope. The recommended crest width is 16.4 feet. According to these guidelines, the downstream slope is adequate, but upstream slope and crest width are inadequate.

Visual signs of instability of the dam such as slumping, tension cracks, or unusual alignment along the crest were not observed during the inspection.

- 6.3 Seismic Stability: The dam is located in Seismic Zone 2 which presents no great hazard from earthquakes according to the Recommended Guidelines for Safety Inspection of Dams by the Department of the Army, Office of the Chief of Engineers. This recommendation is based upon the fact that static stability conditions are satisfactory, and conventional safety margins exist.
- 6.4 Evaluation: The results of previous stability analyses were unavailable for review as part of this evaluation. Based on the recommended guidelines, the upstream slope is slightly inadequate. However, no signs of potential instability were found during the visual inspection, and a stability check is not required. Further attention should be given to the wet area to the right of the discharge channel at the toe of the dam. It is recommended that this area be regraded to improve surface drainage and monitored for seepage.

Despite the inability of the spillway to pass the SDF (as described in Section 5 of this report), the depth, duration, and rate of overtopping flows are not considered detrimental to the embankment. Overtopping flows are shallow and last only 0.8 hours, and the velocity is less than 6 f.p.s., the effective eroding velocity for a vegetated earth embankment.

NAME OF DAM: DIGIULIAN DAM

## SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

- 7.1 Dam Assessment: There is insufficient information to evaluate foundation conditions and embankment stability. There were no engineering data available for use in preparing this report. Deficiencies discovered during the field inspection and office analyses require remedial treatment. The dam and appurtenant structures are in fair overall condition. Maintenance of the dam is considered inadequate. A stability check of the dam is not required.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 100-year flood was selected as the SDF for the "small" size - "significant" hazard classification of DiGiulian Dam. The spillways are capable of passing up to 84 percent of the SDF or 12 percent of the PMF without overtopping the dam. The SDF was found to overtop the dam by a maximum depth of 0.7 feet with an average critical velocity of 2.9 feet per second (f.p.s.).

Despite the inability of the spillway to pass the SDF, the depth, duration, and rate of overtopping flows are not considered to be seriously detrimental to the embankment. Overtopping flows are shallow and last only 0.8 hours, and the velocity is less than 6 f.p.s., the effective eroding velocity for a vegetated earth embankment.

The spillway is adjudged as inadequate, but not seriously inadequate.

There is no warning system or emergency action plan currently in operation.

- 7.2 Recommended Remedial Measures: The saturated area 50 feet from the principal spillway outlet should be regraded to provide better surface drainage. It should then be examined on a regular basis and after periods of heavy rainfall for flow and turbidity. If flow or turbidity are noted, a qualified geotechnical firm should be retained to further evaluate the condition.

Regular inspections should be made of the dam and appurtenant structures. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be completed annually.

NAME OF DAM: DIGIULIAN DAM

A formal warning system and emergency action plan should be developed and implemented as soon as possible.

The following repair items should be accomplished as part of the general maintenance of the dam.

- 1) Remove all trees and brush growing on the embankment by cutting at ground level. Trees with a trunk diameter greater than 3 inches should also have their root systems removed and the resultant holes backfilled, compacted, and seeded.
- 2) Regrade and compact the upstream slope and provide erosion protection above normal pool level.
- 3) Backfill, compact, and seed animal burrows.
- 4) Remove debris, trees, and brush blocking the downstream channel.
- 5) Install a staff gage to monitor reservoir levels above normal pool.

NAME OF DAM: DIGIULIAN DAM

APPENDIX I

PLATES



## CONTENTS

Location Plan

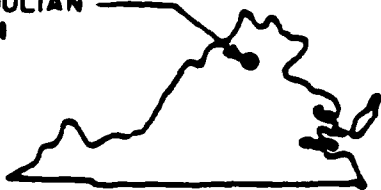
Plate 1: Field Sketch

Plate 2: Top of Dam Profile

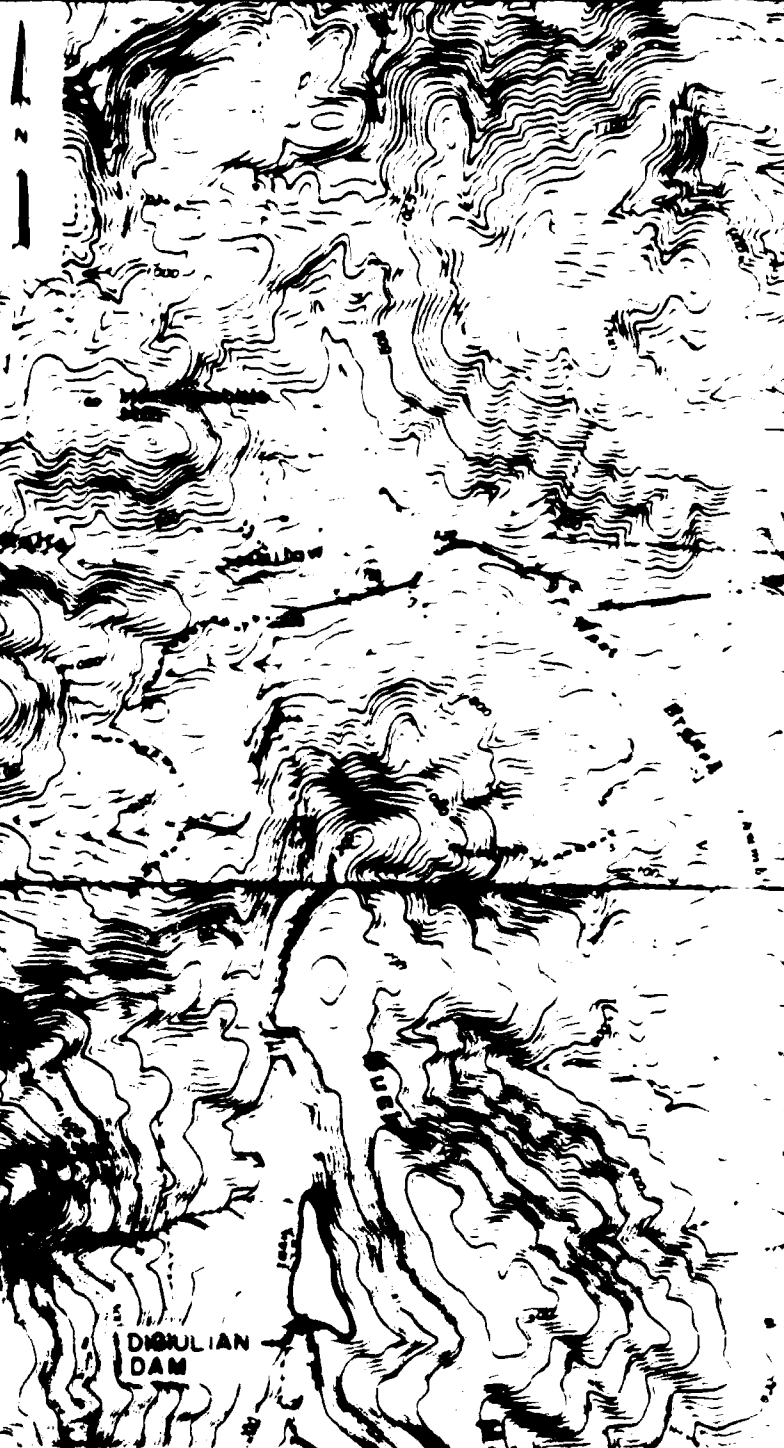
Plate 3: Typical Cross Sections

NAME OF DAM: DIGIULIAN DAM

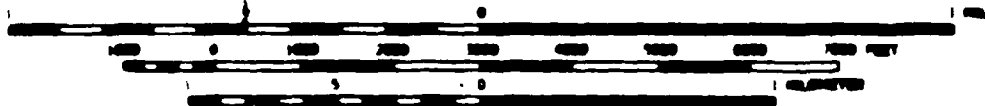
DIGIULIAN  
DAM



VA.



SCALE 1:24,000

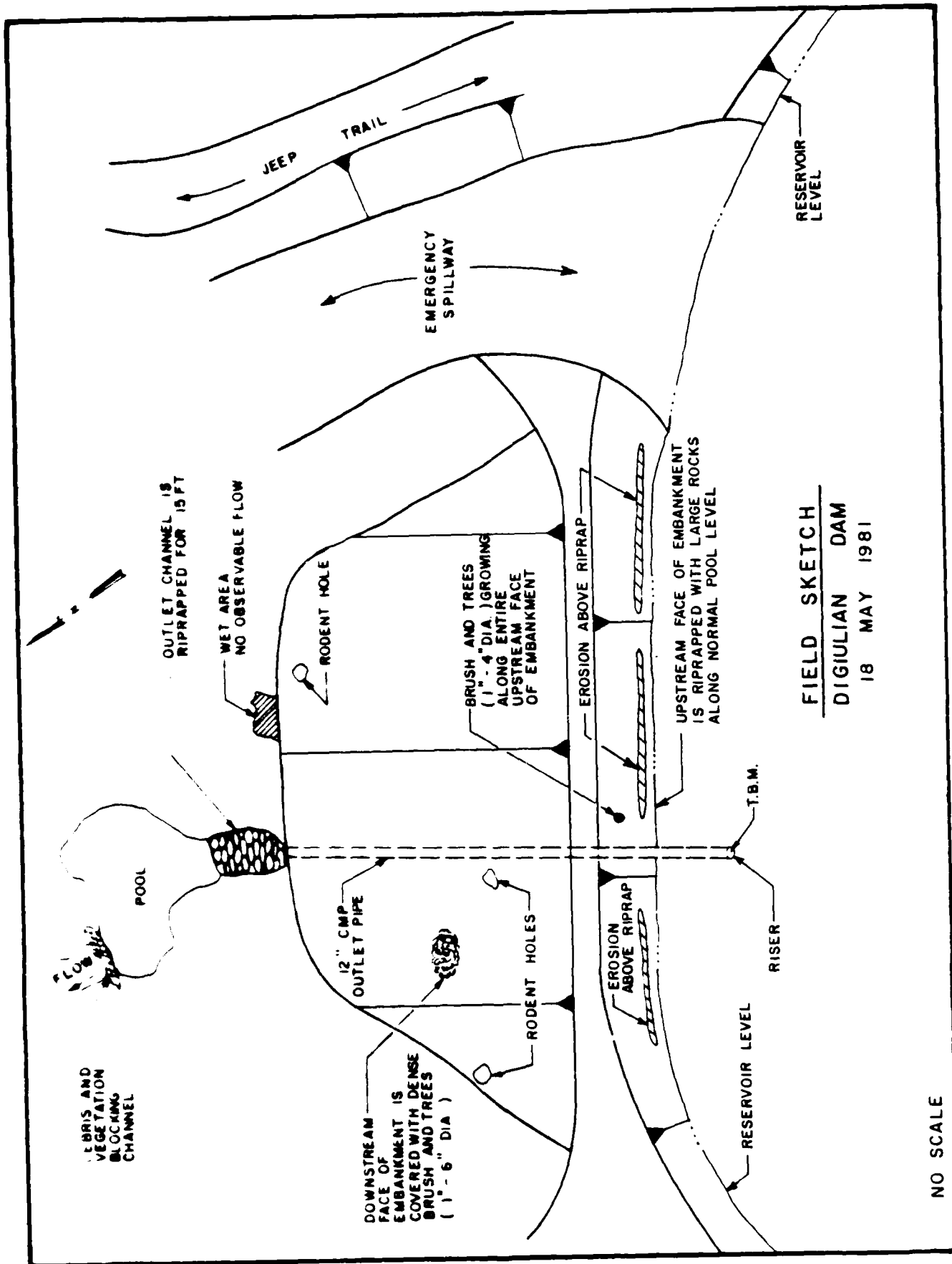


REFERENCES

- 1. S.G.S. 75 LINDEN, VA  
QUADRANGLE PHOTO REVISÉ 979
- 2. S.G.S. 75 FLINT HILL, VA  
QUADRANGLE 966

LOCATION PLAN

DIGIULIAN DAM



FIELD SKETCH  
 DIGIULIAN DAM  
 18 MAY 1981

NO SCALE

MICHAEL BAKER, JR., INC.  
THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject DISJUNCTION DAM

Computed by 11

Checked by 11

S.O. No.

Sheet No. 31

Drawing No.

Date

1010

1000

1. WINDY TOP OF  
DAM EL. 1035 FT.

2. REEKS ROAD  
EL. 1021.1 FT.

1000

1000

1000

3. REEKS ROAD  
EL. 1021.1 FT.

[illegible]

0-1 1-2 2-3 3-4

1. The first group of people who are interested in the results of the study are the researchers themselves. They want to know if the study was successful in achieving its objectives and if the results are consistent with their expectations.

Completed by:                     

Checked by

S. C. No.

Sheet No 21

Drawing No

Date \_\_\_\_\_

1911  
1912

## CONTENTS

- Photo 1. Upstream Face of Embankment
- Photo 2. Emergency Spillway and Downstream Face of Embankment
- Photo 3. View Along Dam Crest
- Photo 4. River Structure
- Photo 5. Outlet Pipe
- Photo 6. Pond at Downstream Toe of Embankment
- Note: Photographs were taken on 18 May 1981.

**DIGIULIAN DAM**



**PHOTO 1. Upstream Face of Embankment**



**PHOTO 2 Emergency Spillway and Downstream Face of Embankment**



**DIGIULIAN DAM**



**PHOTO 3. View along Dam Crest**



**PHOTO 4. Pier Structure**

**DIGIULIAN DAM**



**PHOTO 5. Outlet Pipe**



**PHOTO 6. Pond at Downstream Toe of Embankment**

APPENDIX III  
VISUAL INSPECTION CHECK LIST

Check List  
Visual Inspection  
Phase I

Name of Dam DUGULIAN DAM County Fauquier State Virginia Coordinates Lat. 3851.7  
Long. 7801.1

Date of Inspection 18 May 1981 Weather Overcast, Drizzle Temperature 65°F.

Pool Elevation at Time of Inspection 1000.4 T.B.M. Tailwater at Time of Inspection 973.6 T.B.M.

Inspection Personnel:

Michael Baker, Jr., Inc.:

Wayne D. Lasch  
Steve M. Lockington  
Dave W. Miller

Owner's Representatives:

--

Virginia State Water Control  
Board:

Hugh Gildea

Wayne D. Lasch Recorder

# EMBANKMENT

Name of Dam DIGULIAN DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	<p>Riprap consisting of large rocks has been placed along the upstream face of the dam at normal pool level. This riprap extends to approximately 1 - 2 ft. above normal pool level. Erosion of the embankment face above the riprap is occurring along the entire length of the dam. This erosion has created vertical drops of 1 ft. in some areas.</p>	<p>The upstream face should be filled in and regraded. Erosion protection should be placed on slope above normal pool level.</p>

EMBANKMENT

Name of Dam DIGIULIAN DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST
---

No problems observed.
-----------------------

RIPRAP FAILURES
-----------------

None observed.
----------------

# EMBANKMENT

Name of Dam DIGIULIAN DAM

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	ANY NOTICEABLE SEEPAGE	Entire dam except center line of crest is covered with brush and trees 1 in. - 6 in. diameter. Rodent holes were observed on downstream face at scattered locations.	Remove trees and brush from dam. Fill rodent holes, compact and seep.
		No seepage was observed. However, a saturated area was observed approximately 50 ft. to the right of the outlet conduit at the downstream toe of the embankment. There was no measurable flow from the area.	The wet area may be the result of surface runoff. The area should be re- graded to improve surface drainage and monitored in future inspections.
STAFF GAGE AND RECORDER	DRAINS	None observed.	A staff gauge should be installed to monitor reservoir levels above normal pool.
		None observed.	

# OUTLET WORKS - Principal Spillway

Name of Dam: DIGGULIAN DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not applicable.	
INTAKE STRUCTURE	<p>The intake consists of a 15-in. diameter corrugated metal riser pipe. A 21-in. CMP has been loosely placed on top of the riser which forms a trash rack. Water flows through the gap between the two pipes and into the 15-in. riser pipe (see photos). No problems were observed.</p>	
OUTLET STRUCTURE	<p>The riser is connected to a 12-in. diameter CMP which passes through the embankment. The pipe appeared to be in good condition, but the vegetation growing on the downstream face of the embankment is gradually covering the pipe.</p>	<p>Remove the trees and brush from the dam.</p>
OUTLET CHANNEL	<p>The outlet channel is a steep, ripped channel for the first 15 ft. downstream from the outlet pipe. No problems observed.</p>	
EMERGENCY GATE	None observed.	



# UNGATED SPILLWAY - Emergency Spillway

Name of Dam: DIGIULIAN DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None.	
APPROACH CHANNEL	The reservoir bottom gradually rises to meet the entrance to the emergency spillway. The spillway is a trapezoidal earth cut at the right abutment. The channel is well vegetated with grass. No problems were observed.	
DISCHARGE CHANNEL	The spillway discharges into a wooded area; flow is directed away from dam and rejoins the outlet channel further downstream. No problems observed.	
BRIDGE AND PIERS	None.	

# INSTRUMENTATION

Name of Dam: DIGULIAN DAM

<u>VISUAL EXAMINATION</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
<b>MONUMENTATION/SURVEYS</b>	None were located during the inspection.	
<b>OBSERVATION WELLS</b>	None.	
<b>WEIRS</b>	None.	
<b>PIEZOMETERS</b>	None.	
<b>OTHER</b>	None.	

# RESERVOIR

Name of Dam: DUGGULIAN DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir area consists of wooded areas and pastures with steep slopes. Minor erosion around reservoir edges at normal pool level was observed. No other problems were observed.	The erosion observed is not believed to be a significant problem.

## SEDIMENTATION

The reservoir appears free from significant sedimentation problems. Soundings were taken at normal pool level and revealed that the reservoir is 21 ft. deep at 150 ft. from shore near the center of embankment.

# DOWNSTREAM CHANNEL

Name of Dam: DELICATA DAM

## VISUAL EXAMINATION OF

## OBSERVATIONS

## REMARKS OR RECOMMENDATIONS

### CONDITION

(OBSTRUCTIONS,  
DEBRIS, ETC.)

The channel is to downstream from the outlet works is choked with heavy grass and vegetation, causing a pool of water to form.

Channel is choked with heavy grass and vegetation, causing a pool of water to form.

### SLOPES

A narrow valley confines the channel, and the area is overgrown with large trees and other vegetation. The channel has moderate slopes.

### APPROXIMATE NO. OF HOMES AND POPULATION

One home is located about 100 feet upstream from the dam, and within 100 feet of the 1.98 mile downstream flow line.

APPENDIX IV  
GENERAL REFERENCES

#### GENERAL REFERENCES

1. Bureau of Reclamation, U.S. Department of the Interior, Design of Small Dams, A Water Resources Technical Publication, Revised Reprint, 1977.
2. Chow, Ven Te, Handbook of Applied Hydrology, McGraw - Hill Book Company, New York, 1964.
3. Chow, Ven Te, Open Channel Hydraulics, McGraw - Hill Book Company, New York, First Edition, 1959.
4. Commonwealth of Virginia, "Geologic Map of Virginia," Department of Conservation and Economic Development, and Division of Mineral Resources, 1963.
5. HR 33, "Seasonal Variations of Probable Maximum Precipitation East of the 105th Meridian for Areas 10 to 1000 Square Miles and Durations of 6 to 48 Hours," (1956).
6. Fing, Horace Williams and Brater, Ernest F., Handbook of Hydraulics, Fifth Edition, McGraw - Hill Book Company, New York, 1963.
7. Soil Conservation Service, "National Engineering Handbook - Section 4, Hydrology," U.S. Department of Agriculture, 1964.
8. Soil Conservation Service, "National Engineering Handbook - Section 5, Hydraulics," U.S. Department of Agriculture.
9. U.S. Army, Hydrologic Engineering Center, "Flood Hydrograph Package (HEC-1), Dam Safety Investigations, Users Manual," Corps of Engineers, Davis, California, September 1978.
10. U.S. Army, Hydrologic Engineering Center, "HEC-2 Water Surface Profiles, Users Manual," Corps of Engineers, Davis, California, October 1973.
11. U.S. Army, "Inventory of United States Dams," Corps of Engineers, 9 September 1978.
12. U.S. Army, Office of the Chief of Engineers, "Appendix D, Recommended Guidelines for Safety Inspection of Dams," National Program of Inspection of Dams, Volume 1, Corps of Engineers, Washington, D.C., May 1975.

NAME OF DAM: DIGIULIAN DAM

13. U.S. Army, Office of the Chief of Engineers, Engineering Circular EC-1110-2-163 (Draft Engineering Manual), "Spillway and Freeboard Requirements for Dams, Appendix C, Hydrometeorological Criteria and Hyetograph Estimates," (August 1975).
14. U.S. Army, Office of the Chief of Engineers, Engineering Circular EC-1110-2-188, "Engineering and Design, National Program of Inspection of Non-Federal Dams," Corps of Engineers, Washington, D.C., 30 December 1977.
15. U.S. Army, Office of the Chief of Engineers, Engineer Technical Letter No. ETL 1110-2-134, "Engineering and Design, National Program of Inspection of Non-Federal Dams, Review of Spillway Adequacy," Corps of Engineers, Washington, D.C., 10 May 1978.
16. U.S. Department of Commerce, "Technical Paper No. 40 Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years," Weather Bureau, Washington, D.C., May 1961.
17. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, "Hydrometeorological Report No. 51, Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Washington, D.C., June 1978.

NAME OF DAM: DIGIULIAN DAM

DATE  
FILMED  
— 8